Dr. Marc Anthony Fusaro, Ph.D.
Director, Center for Business and Economic Development
and
Associate Professor of Economics

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Emporia State Economic Index is a new measure of economic activity in Kansas
What’s Wrong with State GDP?

- The ultimate measure of the economy: GDP

- Look at the last year for Kansas:
  - 2016Q3 – Jul-Aug-Sept – $153,801
  - 2016Q4 – Oct-Nov-Dec – $154,574
  - 2017Q1 – Jan-Feb-Mar – $155,204
  - 2017Q2 – Apr-May-Jun – NA
  - 2017Q3 – Jul-Aug-Sept -- NA

- Two problems:
  - Timeliness
  - Frequency
How Can We Do Better?

- What do we know that is timely and frequent?
  - Employment Data
  - Housing Sales
  - Philadelphia Fed Coincident Index
  - Imports-Export Data
  - Sales Taxes
  - Oil Prices

- We use this data to estimate monthly state GDP
*Step 1: Use quarterly data to understand the relationship between GDP and those variables.

*Step 2: Use this knowledge to estimate monthly GDP.

*Step 3: Use the known quarterly data to correct the estimates.
Use quarterly data to understand the relationship between GDP and those variables.

- Data (quarterly historical)
  - GDP
  - Employment Data
  - Housing Sales
  - Philadelphia Fed Coincident Index
  - Imports-Export Data
  - Sales Taxes (OK)
  - Oil Prices (OK)

The ARIMA Model:

\[
GDP_i = \alpha_0 + \alpha_1 \text{Emp}_i + \alpha_2 \text{Home}_i + \alpha_3 \text{Philly}_i + \alpha_4 \text{Imports}_i + \alpha_5 \text{Exports}_i + \alpha_6 \text{Tax}_i + \alpha_7 \text{Oil}_i + \varepsilon_i
\]

Now we have coefficients: \( \alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \) and \( \alpha_7 \)
Estimated GDP: Step 2

Use this knowledge to estimate monthly GDP.

- Known (monthly, current data)
  - Employment Data
  - Housing Sales
  - Philadelphia Fed Coincident Index
  - Imports-Export Data
  - Sales Taxes (OK)
  - Oil Prices (OK)

- Known
  - Coefficients: $\alpha_i$ for $i = 1 .. 7$

- Unknown
  - GDP

The Simulation:

$$\hat{Y}_i = \alpha_0 + \alpha_1 \text{Emp}_i + \alpha_2 \text{Home}_i + \alpha_3 \text{Philly}_i + \alpha_4 \text{Imports}_i + \alpha_5 \text{Exports}_i + \alpha_6 \text{Tax}_i + \alpha_7 \text{Oil}_i$$

Now we have an estimate of monthly GDP ($\hat{Y}$).
Use the known quarterly data to correct the estimates.

- Condition 1: Adjusted monthly GDP averages to known quarterly GDP

\[ \left( \bar{Y}_{\text{jan}} + \bar{Y}_{\text{feb}} + \bar{Y}_{\text{mar}} \right) / 3 = \text{GDP}_{Q1} \]

- Condition 2: growth rates of adjusted monthly GDP are in proportion to growth rates of simulated monthly GDP.

\[ \frac{\bar{Y}_{\text{mar}}}{\bar{Y}_{\text{feb}}} = \gamma \frac{Y_{\text{mar}}}{Y_{\text{feb}}} \]

and

\[ \frac{\bar{Y}_{\text{feb}}}{\bar{Y}_{\text{jan}}} = \delta \frac{Y_{\text{feb}}}{Y_{\text{jan}}} \]
We predict GDP for Kansas plus a 6-state reference group
From the GDP estimate, we calculate an Index

- First we calculate per capita GDP
  \[ \text{GDP} / \text{Population} \]

- Then we rebase this estimate to the 2009 average across the states
  \[ \text{Per Cap GDP} / \text{2009 per cap GDP average} \]
• KS is mid-pack
• KS leads MO
• AR trails
• AR is below 100
• NE sets the pace
Most recent activity

Economic Index Growth rate per state

*All numbers are in percentage

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- KS has strong growth
- OK and MO are stronger
- NE has dropped a bit
Conclusion

- Monthly GDP is an innovative tool to understand and predict economic activity
- The new economic index is more timely and frequent than the BEA data
- New opportunities are open for:
  - economists to have a real-time economic indicator
  - businesses to follow consumption trends timely and predicts Peak times
  - researchers and students for their research/papers

Watch for the ESEI Data Every Month

Give me your business card and I will put you on our mailing list.